



Shuttle Mission STS-88: *Launching a New Era in Earth Orbit*

Launch Date/Site: July 1997/Kennedy Space Center - Pad 39B

Orbiter: Endeavour - 13th Flight

Orbit/Inclination: 230 statute miles/51.6 degrees

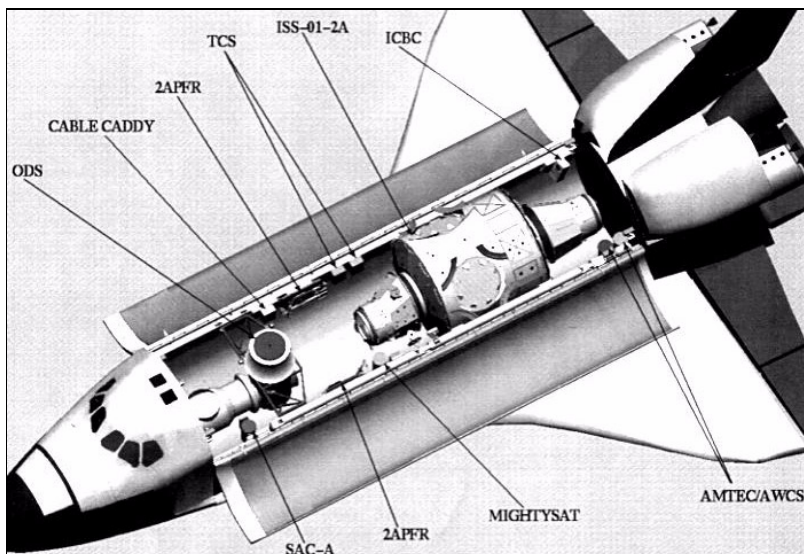
Mission Duration: 11 days

Cargo Bay Payloads: Node 1 with PMA-1 and PMA-2 attached (ISS-2A)
IMAX Cargo Bay Camera (ICBC)
Mightysat 1 (deployed after ISS activities completed)

Flight Crew: Robert D. Cabana (Col., USMC), Commander
Frederick Sturckow (Major, USMC), Pilot
Nancy Currie (Major, USA), Mission Specialist
Jerry Ross (Col., USAF), Mission Specialist (EV crewmember)
Jim Newman, Ph.D., Mission Specialist (EV crewmember)

STS-88 Overview

The crew, trainers, mission planners and flight controllers for Space Shuttle mission STS-88 have already begun a year of training at the Johnson Space Center, Houston, to prepare for the task of starting the largest, international cooperative space venture in history.



STS-88 cargo bay layout: docking system forward, Node 1 aft

The Space Shuttle Endeavour is scheduled for a launch in July 1998 to carry Node 1 and two mating adapters into orbit, the first U.S.-built components of the International Space Station. Endeavour's launch will follow the launch of the first element of the station – the Functional Cargo Block, or FGB as it is

known by a Russian acronym – by only about two weeks. The FGB will be boosted into orbit by a Russian Proton rocket from the Baikonur Cosmodrome in Kazakhstan. Funded by the U.S. but built by Boeing and the Russian Space Agency, the FGB is a self-supporting, active vehicle that will provide propulsive control capability and power for the early station. After it achieves orbit, it will await the arrival of Endeavour and Node 1, the main connecting point for later U.S. station modules and components.

Astronaut Robert D. (Bob) Cabana (Col., USMC) will command STS-88. Joining Cabana on the flight deck of Endeavour will be pilot Frederick "Rick" Sturckow (Major, USMC). Rounding out the crew are Mission Specialists Nancy Currie (Major, USA), Jerry Ross (Col., USAF), and Jim Newman, Ph.D. Ross and Newman also are designated extravehicular activity (EVA) crewmembers and will perform three spacewalks during the mission. STS-88 marks Cabana's fourth flight in space. He has served as chief of the Astronaut Office at JSC since 1994. Currie and Newman each will be making their third flight into space. Ross will be making his sixth space flight. Sturckow will be making his first space flight.

FGB Rendezvous and Capture

The Shuttle's rendezvous with the FGB actually begins with the precisely timed launch of Endeavour. Periodically during the 48 hours following launch, a series of rendezvous maneuvers will be performed by Cabana and Sturckow to slowly close in on the orbiting FGB. A day before the final rendezvous with the FGB, Currie will use the Shuttle's robotic arm to lift Node 1 from its berth in the aft cargo bay and securely latch it atop the Orbiter Docking System in the forward portion of the bay.

The final approach to the FGB will be flown manually by Cabana, moving straight up from underneath the FGB along an imaginary 'R-Bar,' or radius vector. This approach will be similar to those now flown by the Shuttle when docking with the Russian Mir Space Station. As the Shuttle closes in on the FGB, Currie will maneuver the robotic arm to a position above the cargo bay, in place to latch onto the FGB. Cabana will complete the rendezvous by placing the edge of Endeavour's payload bay within about 10 feet of the FGB, allowing Currie to capture the FGB with the arm and dock it on the Node's Pressurized Mating Adapter (PMA).

Because the view of the FGB from the crew cabin windows will be blocked by the node, the final minutes of the rendezvous and capture will be conducted by the crew using only television monitors and the assistance of the Orbiter Space Vision System, an optical alignment aid that has been extensively tested on Shuttle flights leading up to STS-88. The alignment system uses the orbiter's closed circuit television system's view of special markings on the FGB to create a precise maneuvering aid for the crew when a direct line of sight is unavailable.

The Node is launched with a PMA attached to either end. One will serve as a permanent connection between the Node and the FGB while the other will serve as a docking port for future Shuttle missions. The node will be launched with one stowage rack inside

loaded with equipment that will be used by the first station crew when they arrive in early 1999. The node has room for three more racks to be delivered later in the station's assembly.

STS-88 Extravehicular Activity

Once the FGB and Node 1 are mated, Ross and Newman will conduct three EVAs, or spacewalks, to connect power and data transmission cables between the node, PMAs and the FGB. One six-hour spacewalk will be carried out every other day with the first occurring the day after FGB rendezvous and mating.

The first EVA will consist primarily of attaching umbilicals and connectors between the PMAs, Node 1 and the FGB. Ross and Newman will begin by setting up the payload bay and worksites for the three EVAs. A slidewire will be installed first for safety and to provide clearances while connecting umbilicals between PMA 1 and Node 1. Eight umbilicals will be connected, four primary and four redundant. Jumper cables will then be installed on the Russian-American Converter Unit for Common Berthing Mechanism operations and data buss termination connectors will be installed. Following the umbilical connections between PMA 1, the node and the FGB, Ross and Newman will remove multiplexer-demultiplexer (MDM) thermal covers on PMA-1.

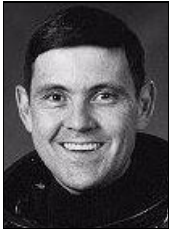
Command checks between Mission Control, Houston, and Mission Control, Moscow, will be conducted the next day while the crew pressurizes the Orbiter Docking System vestibule, completes leak checks and prepares the S-band early communications equipment for the second spacewalk. The ground control checks will include verifying command capability to the FGB from Houston via the control center outside of Moscow. PMA-1 will be pressurized via the FGB and an initial leak check will be carried out and capture latches on the CBM will be engaged. While a trace contaminant filter is activated in the FGB from Moscow, the Node 1 cabin fan will be activated from Houston.

On the second EVA, Ross and Newman will install handrails and worksite interfaces as well as remove hatch and petal launch restraints from both the left and top berthing mechanisms on the node. The two astronauts also will install S-band early communications system antennas, an MDM sunshade and trunnion pin covers. On the day before the final scheduled spacewalk, the crew will enter the node, mating adapters and the FGB through the Shuttle docking mechanism for the first time. Once inside, portable fans and lights will be installed along with components of the S-band early communications system.

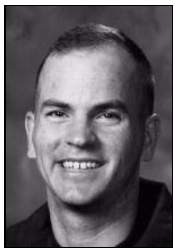
The third and final spacewalk will begin with the astronauts disconnecting the RACU jumper cables and installing deadfaced connectors. Connector cables then will be installed on the Assembly Power Converter Unit. The Androgynous Peripheral Attachment System harness will be disconnected at PMA 2 and tool boxes will be stowed on the outside of Node 1 for use by future assembly crews. The day following the spacewalks, Endeavour will undock from the two components, completing the first

Space Station assembly mission. For more information on the International Space Station, visit the home page at <http://station.nasa.gov>.

STS-88 Crew



Robert D. (Bob) Cabana, 48, Col., USMC, will command STS-88. Selected as an astronaut in 1985, Cabana was born in Minneapolis, Mn., and will be making his fourth space flight. Cabana's first shuttle flight was as pilot of STS-41 in October 1990, a mission that deployed the Ulysses planetary probe to study the polar regions of the Sun. He next flew as pilot of STS-53 in December 1992, a mission that deployed the classified Department of Defense-1 payload. His third flight was as commander of STS-65 in July 1994, an International Microgravity Laboratory mission with more than 80 experiments from 15 different countries. He has logged more than 353 hours in space and more than 5,000 flying hours in 33 different types of aircraft.



Frederick (Rick) Sturckow, 35, Capt., USMC, will serve as pilot. Selected as an astronaut in 1994, Sturckow considers Lakeside, Ca., his hometown and will be making his first space flight. Sturckow earned his wings in the Marine Corps in 1987 and attended the Navy Fighter Weapons (Topgun) School in 1990. He flew 41 combat missions during Operation Desert Storm. In 1992, Sturckow attended the U.S. Air Force Test Pilot School, and later served as a test pilot at the Naval Air Warfare Center, Patuxent, Md. He has logged more than 2,500 flying hours in over 40 different aircraft.



Nancy J. Currie, Ph. D., 38, Major, USA, will serve as a mission specialist on STS-88. Selected as an astronaut in 1990, Currie considers Troy, Oh., to be her hometown and will be making her third space flight. Currie first flew on STS-57 in June 1993, a mission that retrieved the EURECA satellite. Her next flight was on STS-70 in July 1995, a mission that deployed the final NASA Tracking and Data Relay Satellite. Currie has logged more than 454 hours in space.



Jerry L. Ross, 49, Col., USAF, will serve as a mission specialist and extravehicular activity crew member. Selected as an astronaut in 1980, Ross was born in Crown Point, In., and will be making his sixth space flight. Ross flew as a mission specialist on STS 61-B in December 1985; STS-27 in December 1988; STS-37 in April 1991; STS-55 in April 1993; and STS-74 in November 1995. He has logged more than 850 hours in space, including 23 hours on four spacewalks.



James H. (Jim) Newman, Ph.D., 40, will serve as a mission specialist and extravehicular activity crew member. Selected as an astronaut in 1990, Newman considers San Diego, Ca., his hometown.and will be making his third space flight. Newman served as a mission specialist on STS-51 in September 1993 and on STS-69 in September 1995. He has logged more than 496 hours in space, including 7 hours on one spacewalk.